

12.47 KV SYSTEM: ALS SWITCHING STATION (SW-A3) EMERGENCY RESPONSES EMERGENCY PROCEDURE

APPLICATION

For use by Facilities Division electricians. This procedure is part of the operations manual for the 12-kV power system. See ADMN-056 for an overview of the manual's contents, including related procedures.

This procedure should be carried out **ONLY** by a qualified electrician who has been instructed and trained to work on the 12.47 kV system. Any Facilities personnel performing this procedure must be familiar with the general operating and information procedures regarding this system.

PURPOSE:

Response to an emergency at the ALS Switching Station.

SCOPE (by Work Steps):

The following Work Steps are guidelines for addressing conditions in the field.

- A. All ALS Switching Station Emergencies: Determine which breaker(s) have tripped and go to the appropriate work steps in this procedure.
- B. Phase Overcurrent (51) for Incoming Main Breakers.
- C. Ground Overcurrent (51N) for Incoming Main Breakers.
- D. Phase Time Overcurrent (51) for Feeder Breakers.
- E. Ground Overcurrent (50/GS) for Feeder Breakers.

SPECIAL INSTRUCTIONS

Special equipment required:

- High voltage gloves, flash suit, or other protective clothing as required by LBNL Switching Tag;
- LBNL locks and tags.

WORK STEPS

A. All ALS Switching Station Emergencies

1. Refer to Diagram 7R0574.
2. **Locate tripped breaker.** Determine which breaker(s) has tripped, then go to the specified procedure section.
 - **IF** incoming line main circuit breaker (52-A301 or 52-A302) trip on PHASE OVERCURRENT (51), **GO TO Section B.**
 - **IF** incoming line main circuit breaker (52-A301 or 52-A302) trip on GROUND OVERCURRENT (51N), **GO TO Section C.**
 - **IF** any feeder breaker has tripped OPEN, and there is a PHASE TIME OVERCURRENT relay target (51), this indicates an overload or short circuit condition existed on that particular feeder circuit. **GO TO Section D.** (The instantaneous element (50) of the relay has been disabled for coordination with the downstream breakers.)
 - **IF** feeder breaker has tripped OPEN on INSTANTANEOUS GROUND OVERCURRENT (50GS), **GO TO Section E.**

B. Phase Overcurrent (51) for Incoming Main Breakers

1. Check incoming line main circuit breaker trip (52-A301 or 52-A302).
 - a. **IF** there is a 51 relay trip target, check all feeder breakers (52-A304 through 52-A316):
 - b. **IF** all feeder breakers are still closed, this indicates an overload condition existed on the 12.47 kV incoming line. **GO TO** Step 2.
 - c. **IF** any feeder breaker has tripped OPEN, and there is a PHASE TIME OVERCURRENT relay target (51), this indicates an overload condition or short circuit condition existed on that particular feeder circuit. **GO TO** Section D.
2. Note and record the condition of all relay targets in the Switching Station Log.
 - Provide information for entry into Electric Shop Log as required.
3. Reset the relay targets, **ONLY** with a Facilities Electrical Engineer's approval.
4. Open all feeder breakers on the affected bus.

NOTE: Complete LBNL Switching Tag prior to Step 5.

5. Reclose the incoming line breaker.
 - **IF** breaker holds, reclose each feeder breaker, one at a time. Note the operating current of each feeder and compare with previously recorded SCADA readings.
 - **IF** breaker trips, **GO TO** Step 6.
 - **IF** a sustained overcurrent condition exists, take steps to reduce the load.
6. If circuit breaker trips again:
 - a. Note and record relay targets.
 - b. Tag the breaker control OFF. Rack out and lock out the breaker.
 - c. Troubleshoot the feeder circuits to isolate the problem.
7. Restore power when conditions are cleared.
8. Complete log.

C. Ground Overcurrent (51N) for Incoming Main Breakers

1. Check for incoming line main circuit breaker trip (52-A301 or 52-A302):
 - **IF** there is a 51N relay TRIP target, check all feeder breakers (52-A304 through 52-A316).
 - **IF** there is a feeder GROUND OVERCURRENT relay target (50G), this indicates the ground fault condition existed on that particular circuit. **GO TO Section E.**
 - **IF** there is no feeder GROUND OVERCURRENT relay target (50GS), this indicates that a ground fault condition existed in the switchgear, ahead of the feeder ground relays. **GO TO Step 2.**
2. Check protective equipment at area switching station or substation for possible indication of ground fault.
 - Repair as required.
 - If no ground fault is found, isolate the feeder cable by opening disconnect device at load end. **GO TO Step 3.**
3. Troubleshoot.
 - a. Remove the feeder breaker.

CAUTION:

**Unless the incoming line main breaker has been opened,
the bus side of the test cart will be energized.**

- b. Insert test cart. Probe each cable.
- c. Hi-pot each load phase cable to locate possible grounded cable.

- Repair as required.
- **IF** cables test clear, **GO TO Step d.**

d. Hi-pot load area equipment and cables for possible grounds. Repair as required.

4. Restore feeder power when grounds are cleared.
5. Complete Log.

D. Phase Time Overcurrent (51) for Feeder Breakers

1. Check for feeder CIRCUIT BREAKER trip (52-A304 through 52-A316).
2. Check SCADA printout and protective equipment at area switching station or substation for possible indication of overload or short circuit condition.
3. Record trip target in Log.
4. **Check for grounds.** Check protective equipment at area switching station or substation for possible indication of a short circuit.
 - If none is found, isolate the feeder cable by opening disconnect device at load end. **GO TO step 5.**
5. Remove the feeder breaker.

CAUTION:

**Unless the incoming line main breaker has been opened,
the bus side of the test cart will be energized.**

6. Insert test cart.
 - Probe each cable.
7. Hi-pot each load phase cable to locate possible shorted cables.
 - **IF** cable(s) test clear, **GO TO Step 8.**
 - **IF** shorted cable found, repair as required.
8. Hi-pot load area equipment and cables for possible short circuits.
 - Repair as required.
9. Restore feeder power when circuits are cleared.
10. Complete log.

E. Ground Overcurrent (50GS) for Feeder Breakers

1. Check for feeder circuit breaker trip (52-A304 through 52 A316).
2. Check protective equipment at area switching station or substation for possible indication of ground fault.
 - Repair as required.
 - **IF** no fault is found, isolate the feeder cable by opening disconnect device at load end. **GO TO step 3.**
3. Remove the feeder breaker.

CAUTION:

**Unless the incoming line breaker has been opened,
the bus side of the test cart will be energized.**

4. Insert test cart.
 - Probe each cable.
5. Hi-pot each load phase cable to locate possible grounded cable.
 - **IF** cable(s) test clear, **GO TO Step 6.**
 - **IF** grounded cable found, repair as required.
6. Hi-pot load area equipment and cables for possible grounds.

- Repair as required.
7. Restore feeder power when grounds are cleared.
 8. Complete Log.

REFERENCES

1. ADMN-056, 12.47 kV System Operations Manual Binder Document Control.
2. Diagram 7R0574: Meter and Relay Diagram for the Bldg 6 (ALS) Switching Station SW-A3, 12-kV Power System Operations Manual.
3. INFO-048, 12.47 kV System: Protective Relays.

RESPONSIBILITIES AND CONTROLS

Completion of the following signature lines constitutes approval of this procedure:

| REV NO. | SME | REVIEWED BY | APPROVED BY / DATE | REVISION DATE |
|---------|---------------------------------------|---|--|---------------|
| 2 | <i>James Murphy</i> Elec Shop Supv | <i>Lawrence D. Domansky</i> Chief Elec Eng | <i>Martin Johnson</i> 5/21/07 Utilities Mgr | 5/10/07 |
| | <i>James Murphy</i> (Print Name) | <i>LAWRENCE D. DOMANSKY</i> (Print Name) | <i>MARTIN JOHNSON</i> (Print Name) | EMRG-069 |